contact in the other arm. The circuit thus established works a relay which inserts a resistance in the heating circuit, and thus automatically reduces the temperature. The action is remarkably prompt, the regulating circuit being made and broken two or three times per second. The temperature of the thermostat remains constant to within $\frac{1}{2000}$th of a degree C., even when the surrounding temperature changes suddenly by some 12 degrees.—Explorations of the *Albatross* in the Pacific, (iii.), by A. Agassiz. The deepest trawl haul yet made was made about 75 miles east of Tonga-Tabu. It was at 4173 fathoms. The bag brought up a number of large fragments of silicious sponge, belonging probably to the genus Crateromorpha, which had been obtained by the *Challenger* at depths of only 500 fathoms. The bottom consisted of light brown volcanic mud mixed with radiolarians.—Illinois Gulch meteorite, by H. L. Preston. This siderite was found in Montana last year, on the bed rock about four feet below the surface. It weighs 2½ kilograms, and consists of 92 5 per cent. iron, 6·7 per cent. nickel, and traces of cobalt, silicon, phosphorus and carbon. It shows no figures on etching, but greatly resembles the Morrodal siderite of Norway.—The Silurian-Devonian boundary in North America, by H. S. Williams. This first article deals with the Chapman sandstone fauna. It must be regarded as the equivalent of the topmost fauna of the Welsh Silurian system. This classifies the Lower Helderberg formation in the Silurian system.

THE *Physical Review* for January contains the first part of a paper, by Prof. R. A. Fessenden, bearing the title of "A determination of the nature of the electric and magnetic quantities, and of the density and elasticity of the ether."—Mr. B. E. Moore, in the same number, deals with electrolytic polarisation; and Mr. H. V. Carpenter with the comparison of two self-inductances.

## *SOCIETIES AND ACADEMIES.*

### LONDON.

**Royal Society**, February 1.—"On the Influence of the Temperature of Liquid Air on Bacteria." By Allan Macfadyen, M D.

The experiments of Dr. Horace T. Brown and Mr. Escombe (*Roy. Soc. Proc.* vol. 62, 1898, p. 160) have shown that no appreciable influence is exerted upon the germinative power of seeds when exposed for 110 hours to the temperature of liquid air (−183° C. to −192° C.). The results were equally negative in the recent experiments of Sir W. Thiselton-Dyer (*ibid.* vol. 65, 1899, p. 361), in which seeds survived exposure for upwards of six hours to the temperature of liquid hydrogen (−250° C. to −252° C.).

The following investigation on the influence of the temperature of liquid air on bacteria was carried out at the suggestion of Sir James Crichton Browne and Prof. Dewar. The necessary facilities were most kindly given at the Royal Institution. The experiments were conducted under the personal supervision of Professor Dewar, and he has asked me to put the results on record, although it must be acknowledged that the essential features of the investigation are due to him.

Ten organisms were used for the experiments, viz.:—*B. typhosus*, *B. coli communis*, *B. diptheriae*, *Spirillum cholerae Asiaticae*, *B. proteus vulgaris*, *B. acidi lactici*, *B. anthracis* (sporing culture), *Staphylococcus pyogenes albeus*, *B. phosphorescens* and *Photobacterium balticum*.

The cultures were simultaneously exposed to the temperature of liquid air for twenty hours (−182° C. to −190° C.). They were then carefully thawed and examined. The results may be briefly stated. In no instance, whether on solid or in liquid media, could any impairment of the vitality of the micro-organisms be detected. The fresh growths obtained from the exposed tubes were normal in every respect, and the functional activities of the bacteria were equally unaffected. The colon bacillus produced its typical effects—such as the curdling of milk, the fermentation of sugar and the production of indol; the *Staphylococcus pyogenes aureus* retained its pigment-producing properties, and the anthrax spores their pathogenic action, on animals. The photogenic bacteria preserved their normal luminous properties. These photogenic properties are intimately connected with the functional activities of the cells. The cells emit light which is apparently produced by a chemical process of intracellular oxidation, and the phenomenon ceases with the cessation of their activity. These organisms therefore furnished a very happy test of the influence of low temperatures on vital phenomena. Their cultures, when cooled down in the liquid air for twenty hours, became non-luminous, but on rethawing the luminosity returned with unimpaired vigour as the cells renewed their activity. Watery emulsions of the photogenic bacteria, on immersion in liquid air for a few minutes, ceased to emit light, but on withdrawal the luminosity reappeared in a very short time. Strips of filter paper soaked in the watery emulsions and brightly luminous were immersed directly in the liquid air with similar results. The sudden cessation and rapid renewal of the photogenic properties of the cells, despite the extreme changes of temperature, was remarkable and striking.

The above experiments show that bacteria may be cooled down to −190 C. for a period of twenty hours without losing any of their vital properties.

Further experiments are in progress with the above-mentioned, and with other micro-organisms exposed to the temperature of liquid air for still longer periods of time, as well as to that of liquid hydrogen. These experiments will form the subject of a future communication.

March 15.—"The Theory of the Double Gamma Function." By E. W. Barnes, B.A., Fellow of Trinity College, Cambridge. Communicated by Prof. A. R. Forsyth, Sc.D, F.R.S.

**Physical Society**, March 23.—Prof. W. E. Ayrton, F.R.S., Vice-President, in the chair.—A paper on some experiments illustrating syntony was read by Mr. P. E. Shaw. The experiments described in this paper have been devised for the purpose of showing in a lecture-room the principles of magnetic space telegraphy, the distance between the sending and receiving circuits being about fifteen yards. A current flowing in a main circuit was interrupted by a tuning-fork of 100 vibrations per second, and a fraction of the current was passed through the sending coil. The sending coil was placed in series with a coil of adjustable self-induction, and the two coils were shunted with a condenser of variable capacity. By suitable adjustments an oscillation of frequency 400 could be maintained in the sending circuit. The receiving coil was in series with a variable self-induction and a variable capacity, and was tuned to respond to the waves given out by the primary. The current induced in the secondary coil was passed round a light drum fastened to a wire tuned to 400 vibrations per second. The drum was placed in a strong magnetic field, and the electrical oscillations caused mechanical vibrations of the drum. On to the drum was attached one carbon of a microphone, and the induced oscillations were thereby considerably magnified in the microphone circuit. This circuit was also arranged in the same way as the former, and by means of another microphone the vibrations were transferred to another circuit where their intensity was sufficient to actuate the diaphragm of an ordinary telephone receiver to such an extent as to render the sound perfectly audible. Mr. Watson described some experiments which he had shown to illustrate syntony. both by obtaining galvanometer deflections and sparks in the secondary circuit. Dr. Lehfeldt asked how the circuit was tuned when it contained both a variable capacity and a variable self-induction. Mr. Shaw said that the values of the capacity and self-induction were connected with the vibration frequency by a formula given by Dr. Lodge. Starting with a known capacity, the necessary self-induction was calculated and small alterations produced by means of an iron core.—Mr. Shaw then read a paper on an electrical micrometer. In this paper the motion of the centre of a telephone diaphragm was measured by means of a system of levers and a spherometer screw. The screw, which had a pitch of 0·5 mm. and a head divided into 500 parts, pressed against the long arm of an aluminium lever. The short arm of this lever pressed against the long arm of another, and so on through three levers. In this way any motion of the spherometer screw was transmitted to a fine platino-iridium point close to a small platino-iridium disc fastened to the centre of the telephone diaphragm. Since the head of the spherometer could be accurately read to 0·1 of a division by means of a telescope, and since the system of levers minified any motion a hundred-fold, it follows that an accurately observable twist of the spherometer head corresponds to a movement of a millionth of a millimetre or 1 $\mu\mu$ of the fine point. To test the action of the levers, the point was removed and a convex lens substituted. This lens formed one of a system by means of which Newton's rings were produced and

observed. By means of an optical experiment, the author has found that 0·1 of a division on the graduated head equals 1·033 $\mu\mu$ at the platino-iridium point. The point and the diaphragm then formed part of a circuit containing an ordinary telephone, and the levers were so adjusted that the point just touched the diaphragm. A sharp click was then heard in the telephone. A small current was then sent through the electromagnets of the original telephone, and the displacement of the diaphragm measured by turning the spherometer screw until the point just touched it and a second click was heard. By carrying out a series of experiments of this description, a curve has been drawn showing the relation between current strength and diaphragm displacement. It is then interesting, by exterpolation from the curve, to find the movement which corresponds to the least audible sound. The author has done this, and finds that he cannot hear sounds if the amplitude is less than 0·37 $\mu\mu$. A motion of 50 $\mu\mu$ gives comfortable sounds, 1000 $\mu\mu$ uncomfortable sounds, and 5000 $\mu\mu$ sounds unbearably loud. Throughout the experiments it was necessary to get rid of extraneous vibration by means of indiarubber balls and door-spring suspensions, and by working at night. Prof. Everett expressed his interest in the delicacy of the system of measurement, and asked if the micrometer had been used to determine the form of the plate when vibrating. Mr. Phillips asked if experiments on the smallest sound audible had been made on different people, as it would be physiologically interesting to know if this minimum value were constant. Mr. Campbell asked if the sound was expected when heard. Mr. Shaw said he had not conducted experiments on the form of the plate when vibrating, although he had investigated its law of damping. He said the small sounds were expected and the limit varied. The chairman said he found it easy to rid galvanometers and electrometers from extraneous disturbance by placing them on a block of stone resting on a thickness of three or four feet of slag wool contained in a hollow brick pillar.—The Society then adjourned until April 27, when the meeting will be held at eight o'clock in the Solar Physics Observatory of the Royal College of Science.

**Chemical Society,** March 8.—Prof. Thorpe, President, in the chair.—Prof. Warington delivered a lecture on recent researches on nitrification.

March 15.—Prof. Thorpe, President, in the chair.—The following papers were read:—The vapour densities of dried mercury and mercurous chloride, by H. B. Baker. Carefully dried mercurous chloride seems to have the molecular composition $Hg_2Cl_2$ at 448°, thus differing from the undried material, which is known to dissociate at this temperature. Carefully purified and dried mercury is monatomic at 448°.—The preparation of pure hydrobromic acid, by A. Scott. Pure hydrobromic acid is very conveniently prepared by the action of sulphurous acid upon bromine, the product being easily separated, by two or three distillations, from the sulphuric acid simultaneously formed.—A new sulphide of arsenic, by A. Scott. On allowing an arsenate to react with phosphorus trichloride and sulphurous acid at ordinary temperatures a dark brown precipitate is formed, which consists of a new arsenic sulphide having the composition $As_3S$.—The action of iodine on alkalis, by R. L. Taylor. The author shows that the action of iodine upon alkalis in the cold is always the same in the first instance, and consists in the formation of hypoiodite and iodide; the hypoiodite, however, decomposes more or less rapidly, according as the solution is more or less concentrated, into iodate and iodide.—The interaction between sulphites and nitrites, by E. Divers and T. Haga.—The sym-dipropyl, sym-diisopropyl- and $\alpha\alpha'$-propylisopropyl-succinic acids, by W. A. Bone and C. H. G. Sprankling. The authors show that, contrary to the received view, each of the above alkyl-substituted succinic acids exists in two stereoisomerides; both *cis*- and *trans*-isomerides yield their own anhydrides with acetic chloride, and the anhydrides give characteristic anilinic acids with aniline.—Manno-galactan and lævulo-mannan; two new polysaccharides, by J. L. Baker and T. H. Pope. The Indian clearing nut (*Strychnos potatorum*) yields an amorphous manno-galactan on extraction with hot dilute alkali; the new substance gives a mixture of two parts of galactose to one of mannose on hydrolysis. The ivory nut (*Phytelephas macrocarpa*) similarly yields a lævulo-mannan which on hydrolysis gives a mixture of twenty parts of mannose with one of lævulose.—Hydrolysis of semicarbazones, by G. Young and E. Witham.—The dissociation constant of azoimide, by C. A. West. Determinations of the electrical conductivity of aqueous solutions of azoimide show that this substance resembles acetic acid in acid character.—Racemisation occurring during the formation of benzylidene, benzoyl and acetyl derivatives of dextro-ac-tetrahydro-$\beta$-naphthylamine, by W. J. Pope and A. W. Harvey. During the formation of the benzylidene, benzoyl and acetyl derivatives of dectrotetrahydro-$\beta$-naphthylamine nearly, but not quite, all of the material undergoes racemisation.

**Geological Society,** March 7.—J. J. H. Teall, F.R.S., President, in the chair.—Notes on the geology of Gilgit, by Lieut.-General C. A. McMahon, F.R.S. Briefly stated, the author's conclusions are as follows:—That at one period in the elevation of the Hindu Kush the strata were thrown into a series of folds and compressed into a series of uniclinal beds with a vertical dip. That the direction of the main drainage of the area was determined before, or at the commencement, of the last series of earth-movements that crumpled up the strata. The sedimentary rocks were profusely invaded by granite and diorite, and profoundly metamorphosed by contact-action. As regards the age of the rocks, the author gives his reasons for identifying the Gilgit limestones with the conformable Carbo-Triassic series of the Himalaya.—The rocks of the south-eastern coast of Jersey, by John Parkinson. In this paper the author has continued the study of the deep-seated rocks of Jersey, begun in a communication presented to the Society last session, entitled, "On an intrusion of granite into diabase at Sorel Point (Northern Jersey)." A great resemblance exists between these rocks in the north and south of the island, and it is concluded that they represent parts of the same magma; but in the south-east additional complications arise, owing to the intrusion of another rock before the invasion of the granite.—The rocks of La Saline (Northern Jersey), by John Parkinson.

**Anthropological Institute,** March 13.—Mr. C. H. Read, President, in the Chair.—A photographic slide, presented by Mr. Sidney Hartland, was exhibited, representing the figure of a War God from Boma, in the Congo State (now in the museum of Leyden), into which numerous nails have been driven, probably in registration of the prayers or vows of worshippers. The President compared a similar figure in the possession of Miss M. H. Kingsley, in which the nails were explained as records of lives taken through the magic power of the God.—Mr. A. L. Lewis read a paper on "Stone Circles in Scotland," which he classified according to local types as follows: (1) the Western type, consisting of a single ring of stones with a cist or grave within the enclosure; (2) the Inverness type (found also locally along the east coast, north of Inverness, and easily accessible thence by sea) with two concentric rings, of which the inner formed the retaining wall of a cairn, under which was a stone lined sepulchral chamber accessible by a stone lined passage; (3) the Aberdeen type, which differs mainly from that of Inverness in the presence of a large slab set vertically between the two largest stones of the outer ring at a point opposite to the passage leading to the chamber. The more irregular circles and alignments, such as Callernish and Brogars, which the author regarded as not primarily sepulchral, and explained as "sun and star" circles, on the ground of their aspect, and of certain proportions which were found to exist among their dimensions. He insisted upon the ethnological value of the various local types, and upon the importance of testing this by applying a similar classification to the stone circles of England. In discussion, Mr. W. Gowland pointed out that failure to find traces of an interment within a circle did not prove that that circle was not a sepulchral monument originally; and emphasised the points of agreement between the Western, the Inverness, and the Aberdeen types of circle. Dr. J. G. Garson discussed the modes of determining the age of stone circles, in view of the work of the Stone Circles Committee of the British Association. Mr. G. L. Gomme protested against the premature adoption of an astronomical interpretation of individual monuments. Mr. Lewis briefly replied; and the President, in returning thanks, dwelt on the necessity of collecting the local traditions as to the original use of these monuments, and at the same time of distinguishing, as in the case of the Yorkshire "Danes Graves," between aboriginal and immigrant sources of tradition.—Mr. J. L. Myres exhibited and described a series of photographs of the megalithic buildings of Malta and Gozo, and pointed out the inapplicability of certain current theories of their origin.

EDINBURGH.

**Royal Society**, February 19.—Prof. McKendrick in the chair.—Sir John Sibbald read a paper on the statistics of suicide in Scotland. The various tables were arranged to bring out such features in the statistics of suicide as the influence of sex and age, of season, of locality, of town and country, and so on. The prevalent idea that statistics proved an increasing tendency in suicide was shown to be a too hasty deduction from the figures. When the statistics of suicide by hanging—the one method in which there was very little chance of mistake—were compared for the last fifteen years and for the preceding period of fifteen years, the number of suicides per million was exactly the same. Then a careful scrutiny of the returns for deaths by accident showed that the apparent increase in suicide by such methods as drowning, shooting, poisoning, &c., was balanced by a decrease in deaths by accident due to the same causes. It would, therefore, appear that the apparent increase in suicides in the last fifteen years was due, not to a real increase in suicide, but to improved methods of discriminating between suicide and accident. The statistics clearly established the fact that the suicidal rate was less in the western than in the eastern counties of Scotland, a fact which Dr. Clouston, in the after-discussion, explained as being in all probability due to difference of race, the greater Celtic element in the west producing, not necessarily a less suicidal disposition, but a less determined carrying out of the deed of self-destruction.

March 5.—Prof. Duns in the chair.—A paper, by Dr. Thomas Muir, on certain aggregates of determinant minors, was taken as read.—Mr. John Aitken, F.R.S., communicated a paper on the dynamics of cyclones. Attention was first drawn to the conditions under which cyclonic motion was developed both in air and in water; and the dynamic principles underlying the production of the phenomenon were illustrated by means of a neat arrangement of balls hung at the ends of two parallel wires, the whole being capable of rotation about a central vertical axis. When drawn together by pulls along threads which passed through the axis of rotation, the two balls were made to spin round one another with a rapidly increasing angular velocity, thus illustrating the important principle of the conservation of moment of momentum. By a simple modification, the apparatus could be made to illustrate the principle of the conservation of energy. Mr. Aitken emphasised the importance of giving increased attention to the anti-cyclonic distributions which in a sense may be regarded as playing, relatively to the accompanying cyclonic distributions, the same *rôle* as is played by the condenser relatively to the boiler of a steam engine. The direction and rate of movement of a cyclone was shown to be determined by the position and configuration of the region where the isobars were closest; a cyclone whose isobars form a set of concentric circles having little or no translatory motion. This characteristic was explained by the author as due to the direct influence of the anti-cyclonic vortex. Many of the features of cyclones were illustrated by means of an ingenious apparatus in which the necessary upward draught was produced in a tall chimney, the whirls of air developed beneath being made visible by the use of sal-ammoniac fumes. The crossing of currents at different heights was beautifully demonstrated. In conclusion, Mr. Aitken referred to the physiological effects observed in the front area of a cyclone, and thought that these might be explained as due to the impure air rising from the ground. In the after-discussion, Prof. Crum Brown drew attention to the experiments by which Prof. Hunter Stewart had established the fact that the soil breathed out a great deal of carbonic acid gas, and no doubt other emanations as well. Mr. Omond pointed out that the dissimilarity as regards relative dimensions between Mr. Aitken's model and the real cyclone should make us very cautious in applying the results obtained with the model to the explanation of cyclonic effects. Dr. Buchan said that, although most of the storms of the north-west of Europe travelled westwards and were characterised by high westerly and south-westerly winds, there were occasionally cyclones which travelled eastwards, and these were always characterised by high east winds. Dr. Knott took the opportunity of protesting against the tendency of speaking of a cyclone as something independent of the winds that really constituted it. Given a cyclonic condition moving through the air, it is obvious that the strongest winds will be on the whole in the direction of that movement, and consequently the isobars will be closest where the associated wind has this direction. It is merely expressing the same truth in different ways to say that a westward travelling cyclone in our latitudes has its isobars closest to the south and is characterised by high west winds, that a slow moving or motionless cyclone has a symmetrical arrangement of isobars, and that an eastward travelling cyclone has its isobars closest on the north and is characterised by high east winds.—Dr. W. G. Aitchison Robertson read a note on the activity of saliva in diseased conditions of the body, being a continuation of a previous paper. In many diseases the digestive activity of saliva on starchy foods underwent a great diminution. This was particularly the case in disorders of the stomach, and the importance of selecting a proper dietary in such cases was insisted on. In many instances a more thorough examination of the saliva than is customary would almost certainly lead to valuable conclusions, and an examination of this kind had the great merit of being extremely easy.

PARIS.

**Academy of Sciences**, March 19.—M. Maurice Lévy in the chair.—Forces related to the state of perfect elasticity that dynamic contraction creates in the muscle substance. The physiological work intimately constituted by this creation, by M. A. Chauveau.—On linear partial differential equations of the second order with constant coefficients, by M. J. Coulon.—On differential systems with fixed critical points, by M. Paul Painlevé.—On multiplex telegraphy, and a differential telemicrophonic relay, by M. E. Mercadier. A description of a new microphonic relay by means of which it is possible to send a large number of messages simultaneously over the same wire. Between the two end stations, intermediate stations working together with the extremes can be interposed without any difficulties arising.—Relations between the electrolytic conductivity and internal friction of saline solutions, by M. P. Massoulier. Solutions of sulphate of copper in solutions of glycerine and water of various strengths were employed. The resistances were measured both by the Lippmann electrometric method and by the telephone with alternating currents, the viscosity by Poiseuille's method. At 15° the rises of resistance and viscosity with increase of glycerine are proportional, but this does not appear to hold at 0° C.—On a quartz thermometer for high temperatures, by M. A. Dufour. Two quartz thermometers have been prepared, one containing tin, capable of measuring temperatures between 240° and 580° C., and another containing mercury. The study of the zero residues in the quartz-mercury thermometer is under consideration.—Fluorescence of certain metallic compounds when submitted to the Röntgen and Becquerel rays, by M. Paul Bary. Numerous salts of the metals of the alkalies and alkaline earths are divided into two groups according as they were found to be fluorescent or non-fluorescent in the X-rays. The substitution of a radio-active substance for the Crooke's tube showed that all bodies which fluoresce with the X-rays present the same phenomenon with the Becquerel rays. The division proved to be somewhat arbitrary, no general relation between the position of a salt and its chemical composition being apparent.—On the hydrated peroxides of barium, by M. de Forcrand. A calorimetric study of the action of solutions of hydrogen peroxide upon baryta.—On the separation of the rare earths, by M. R. Chavastilon. In the separation of thorium and cerium from lanthanum and didymium, the author reverses the method of M. Urbain and keeps the thorium in solution. Two methods are proposed; in the first the solution of the rare earths is poured into an excess of neutral sodium sulphite, the cerium, lanthanum and didymium being precipitated as sulphites, the thorium remaining in solution. In the second method, the solution of the rare earths is precipitated by adding ammonia and hydrogen peroxide, from which precipitate alkaline bicarbonates extract the thorium and ceriux oxides only.—Chemical reactions produced in a solution; vapour tension of the solvent, by M. A. Ponsot. A mathematical discussion of the conditions under which the vapour pressure of a liquid increases, when reactions occur between substances dissolved in it.—On the detection, estimation and variations in cystine in polluted water, by M. H. Causse. The reagent used is the chloro-mercurate of sodium *p*-diazobenzenesulphonate, which produces with cystine a yellow-orange coloration, the depth of which is proportional to the quantity of cystine present. The author has been able to trace a direct connection between the presence of cystine in a drinking water and an outbreak of typhoid fever.—On certain phenomena presented by nuclei under the action of cold, by MM. L.

Matruchot and M. Molliard. In the plant studied (*Narcissus Tazetta*) the action of cold produced nuclear deformations, which are evidently related to the respective positions of the nucleus and the cell fluid. The most obvious phenomenon is an orientation, generally bipolar, of the chromatic portion with a more or less complete condensation of the chromatin in the equatorial region.—On the toxicity of the compounds of the alkaline earths with respect to higher plants, by M. Henri Coupin. Of the salts tried, barium chlorate proved to be the most injurious. The iodine compounds of all three alkaline earths possess a much higher toxic effect than the other halogen compounds, and for a given acid the toxicity increases with the atomic weight of the metal.—On the pure culture of a green algæ: formation of chlorophyll in the dark, by M. Radais. Comparative experiments on the cultivation of *Chlorella vulgaris* in the daylight and in the dark showed that the multiplication of the cells was the same in both cases. After about a fortnight's growth at 25°, the green tint was also the same in both, the identity of the green colouring matter formed in the dark with chlorophyll being proved spectroscopically.—The andesitic volcano of Tifarouine (Algeria), by M. L. Gentil.—Specific heat of the blood, by M. H. Bordier. The measurements were made by the method of cooling, the upper starting temperature being 45°. Arterial blood, defibrinated blood and serum gave ·901, ·920 and ·932 respectively. The specific heat of arterial blood is greater than that of venous blood (·893). It follows from these figures that the specific heat of the organism taken as a whole must be nearer 0·7 or 0·8 than 1·0 as usually assumed.—Restoration of the functions of the heart and central nervous system after complete anemia, by M. Frédéric Batelli.—Method for the examination and measurement of taste, by MM. Ed. Toulouse and N. Vaschide. Four solutions were employed of salt, sugar, quinine bromhydrate and citric acid, which were systematically diluted. Special precautions as to temperature and mode of contact with the tongue were made, the start being made with a tasteless solution, the strength of which was gradually increased until the taste became perceptible.—Some considerations concerning the freezing of water, by M. F. Bordas.

## DIARY OF SOCIETIES.

*THURSDAY*, MARCH 29.

ROYAL SOCIETY, at 4.30.—On the Retinal Currents of the Frog's Eye, excited by Light and excited Electrically: Dr. Waller, F.R.S.—Observations on the Electromotive Phenomena of Non-medullated Nerve: Miss Sowton.—Variation: Prof. Ewart, F.R.S.—Certain Laws of Variation: Dr. H. M. Vernon.—(1) Data for the Problem of Evolution in Man. IV. Note on the Effect of Fertility depending on Homogamy. (2) Mathematical Contributions to the Theory of Evolution. VII. On the Inheritance of Characters not capable of Exact Quantitative Measurement: Prof. K. Pearson, F.R.S.

ROYAL INSTITUTION, at 3.—Equatorial East Africa and Mount Kenya: H. J. Mackinder.

CHEMICAL SOCIETY, at 3.—Annual General Meeting.—At 8.30.—Bunsen Memorial Lecture: Sir Henry Roscoe, F.R.S.

SOCIETY OF ARTS (Indian Section), at 4.30.—The Manufacture and Use of Indigo: Christopher Rawson.

*FRIDAY*, MARCH 30.

ROYAL INSTITUTION, at 9.—Facts of Inheritance: Prof. J. A. Thomson.

*SATURDAY*, MARCH 31.

ROYAL INSTITUTION, at 3.—Polarised Light: Lord Rayleigh.

*MONDAY*, APRIL 2.

SOCIETY OF ARTS (Foreign and Colonial Section), at 4.30.—The Century in our Colonies: Right Hon. Sir Charles Wentworth Dilke, Bart., M.P.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Explorations in Central Asia: Captain H. H. P. Deasy.

VICTORIA INSTITUTE, at 4.30.—North Polar Thalassography: Cavaliere Jervis.

*TUESDAY*, APRIL 3.

ROYAL INSTITUTION, at 3.—Structure and Classification of Fishes: Prof. E. Ray Lankester, F.R.S.

SOCIETY OF ARTS, at 8.—Process Engraving: Carl Hentschel.

ROYAL METEOROLOGICAL SOCIETY, at 3.—Commemoration Meeting.—Address by Dr. C. Theodore Williams.

ZOOLOGICAL SOCIETY, at 8.30.—On *Mus sylvaticus* and its Allies. Subspecies, and Geographical Variations: G. E. H. Barrett-Hamilton.—Notes on the Mammals of Siam and the Malay Peninsula: Stanley S. Flower.—On a Remarkable New Piece of Skin from Cueva Eberhardt, Patagonia: Dr. Einar Lönnberg.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Economical Railway Construction in New South Wales: Henry Deane.—The Tocopilla Railway: Robert Stirling.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—F. P. Ambrano will show Slides, Old and New.

MINERALOGICAL SOCIETY, at 8.—Hamlinite, Florencite, Plumbogummite (Hitchcockite), Beudantite and Svanbergite as Members of an Isomorphous Group: G. T. Prior.—On the Optical Properties of Chalybite and Diallogite: Dr. A. Hutchinson.—Ægirine (and Riebeckite) Anorthoclase Rocks related to the "Grorudite-Tinguaite" Group from the Neighbourhood of Adoa and Axum, Abyssinia: G. T. Prior.—The Chemical Composition of the Mount Zomba Meteorite: L. Fletcher, F.R.S.

*WEDNESDAY*, APRIL 4

SOCIETY OF ARTS, at 8.—Cotton Supplies: John A. Banister.

GEOLOGICAL SOCIETY, at 8.—Additional Notes on some Eruptive Rocks from New Zealand: F. Rutley.—On the Discovery and Occurrence of Minerals containing Rare Elements: Baron A. E. Nordenskiöld.

ENTOMOLOGICAL SOCIETY, at 8.

SOCIETY OF PUBLIC ANALYSTS, at 8.—Note on the Influence of Temperature and Concentration on the Saline Constituents of Boiler Waters: Cecil H. Cribb.—On an Improved Absorption Apparatus for Use in the Analysis of Essential Oils: Alfred C. Chapman and H. E. Burgess.—On the Composition of Danish Butters: H. Faber.—The Composition of Milk and Milk Products: H. Droo Richmond.

*THURSDAY*, APRIL 5.

ROYAL SOCIETY, at 4.30.—*Probable Papers:* On the Weight of Hydrogen desiccated by Liquid Air: Lord Rayleigh, F.R.S.—Combinatorial Analysis: The Foundations of a New Theory: Major MacMahon, F.R.S.—Über Reihen auf der Convergenzgrenze: Dr. E. Lasker.—Extinct Mammalia from Madagascar. I. *Megaladapis insignis*, sp. n.: Dr. C. J. Forsyth Major.—The Kinetic Theory of Planetary Atmospheres, Part I.: Prof. E. H. Bryan, F.R.S.—Observations on the Effect of Desiccation of Albumin upon its Coagulability: Prof. J. B. Farmer.

ROYAL INSTITUTION, at 3.—Equatorial East Africa and Mount Kenya: H. J. Mackinder.

MATHEMATICAL SOCIETY, at 5.30.—The Orthoptic Loci of Curves of a Given Class: A. B. Basset, F.R.S.

LINNEAN SOCIETY, at 8.—*Sphenophyllum* and its Allies, an Extinct Division of the Vascular Cryptogams: Dr. D. H. Scott, F.R.S.

CHEMICAL SOCIETY, at 8.—(1) The Liquefaction of a Gas by "Self-Cooling": A Lecture Experiment; (2) Note on Partially Miscible Aqueous Inorganic Solutions: G. S. Newth.—The Decomposition of Chlorates. II. Lead Chlorate: W. H. Sodeau.—The Interaction of Mesityl Oxide and Ethyl Sodiomethylmalonate: A. W. Crossley.—The Bromination of Benzeneazophenol: J. T. Hewitt and W. G. Aston.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.

RÖNTGEN SOCIETY, at 8.—The Influence of the X Rays upon the Growth and Development of Micro organisms: Dr. Norris Wolfenden and Dr. Forbes Ross.

*FRIDAY*, APRIL 6.

ROYAL INSTITUTION, at 9.—Solid Hydrogen: Prof. J. Dewar, F.R.S.

GEOLOGISTS' ASSOCIATION, at 8.—Zonal Features of the Kentish Chalk-Pits between London and the Medway Valley: G. E. Dibley.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Experiments on Struts with and without Lateral Loading: H. E. Wimperis.

*SATURDAY*, APRIL 7.

ROYAL INSTITUTION, at 3.—Polarised Light: Lord Rayleigh.

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